

WESTON®

prime source for precision... since 1888



STOCK PANEL METER SELECTOR

DISTRIBUTED BY

SUMMIT DISTRIBUTORS, INC.

916 MAIN STREET

BUFFALO, NEW YORK 14202

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ORDERING INFORMATION

- Select model number, size and style.
- Follow size index tab guide and choose your function and range from the listing.
- Specify the case style you prefer:
 - Round or Square in the 201/301 Series
 - Plastic or Bakelite in the 1900 Series
 - $\frac{1}{2}$ Frame Bezel Mounting in the 1900 Series, described on page 17.
 - Illumination if desired in the 1900 Series, described on page 17.
 - Edgewise meters — specify horizontal or vertical mounting
- Specify magnetic or non-magnetic panel mounting when required, and give panel material and thickness.
- Ask for the Accessories you will need:
 - AC Transformers on page 16.
 - DC Shunts on page 15.
 - Tubular Resistors on page 16.
- For special requirements, call your local Weston Representative.

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SPECIFICATIONS

	Function and Mechanism	Standard Accuracy	Scale Length	Case Front	Model	Ranges & Prices Page
2 1/2"	DC CORMAG®	±2%	1.57"	Bakelite, Sq. or Rd.	201	4-5
	AC Iron Vane	±2%	1.57"	Bakelite, Sq. or Rd.	204•	5
	DC Ext. Magnet	±2%	1.57"	Bakelite, Sq. or Rd.	206•	5
	Thermo Ext. Magnet	±2%	1.57"	Bakelite, Sq. or Rd.	208•	5
	DC CORMAG	±2%	2.3"	Plastic or Bakelite	1921	4-5
	AC Rect. CORMAG	±3%**	2.3"	Plastic or Bakelite	1922	5
	AC Iron Vane	±2%	2.3"	Plastic or Bakelite	1924•	5
	DC Ext. Magnet (Ruggedized)♦	±2%	1.75"	Metal, Rd.	2521	4-5
	AC Iron Vane (Ruggedized)♦	±2%	1.75"	Metal, Rd.	2524	5
3 1/2"	DC CORMAG	±2%	2.36"	Bakelite, Sq. or Rd.	301	6-7
	AC Rect. Type	±3%**	2.36"	Bakelite, Sq. or Rd.	302	8-9
	AC Iron Vane	±2%	2.13"	Bakelite, Sq. or Rd.	304•	8-9
	DC Ext. Magnet	±2%	2.36"	Bakelite, Sq. or Rd.	306•	7
	Thermo Ext. Magnet	±2%	2.36"	Bakelite, Sq. or Rd.	308•	9
	DC CORMAG	±2%	2.7"	Plastic or Bakelite	1931	6-7
	AC Rect. CORMAG	±2%**	2.7"	Plastic or Bakelite	1932	8
	AC Iron Vane	±2%	2.7"	Plastic or Bakelite	1934•	8-9
	DC Ext. Magnet	±2%	2.7"	Plastic or Bakelite	1936•	7
	DC Ext. Magnet (Ruggedized)♦	±2%	2.4"	Metal, Rd.	2531	6-7
	AC Iron Vane (Ruggedized)♦	±2%	2.4"	Metal, Rd.	2534	8-9
4 1/2"	DC CORMAG	±2%*	3.9"	Plastic or Bakelite	1941	10-11
	AC Rect. CORMAG	±2%**	3.9"	Plastic or Bakelite	1942	11
	AC Iron Vane	±2%	3.9"	Plastic or Bakelite	1944•	11
	DC Ext. Magnet	±1%*†	3.9"	Plastic or Bakelite	1946•	10
5 1/2"	DC CORMAG	±1%*	4.7"	Plastic or Bakelite	1951	12
	AC Iron Vane	±2%	4.7"	Plastic or Bakelite	1954•	12
	DC Ext. Magnet	±1%†	4.7"	Plastic or Bakelite	1956•	12
7 1/2"	DC CORMAG	±1%	8.0"	Bakelite	1209	13
	DC CORMAG	±1%†	7.2"	Plastic	1971	13
	DC Ext. Magnet	±1%†	7.2"	Plastic	1976•	13
EDGEWISE	DC CORMAG	±1%††	4.5"	Bakelite	1201	12
	AC Rect. CORMAG	±2%	4.5"	Bakelite	1202	12
	DC CORMAG	±2%	1.25"	Plastic	111	18
	AC Rect. CORMAG	±3%	1.25"	Plastic	112	18

* Knife-edge pointer and mirror scale supplied with 1% accuracy.

** On sine wave 60 cycle source at 25°C.

† 1/2% accuracy available with knife-edge pointer and mirror scale on special order.

†† 1/2% accuracy available on special order.

• External Magnet and AC Iron Vane Models must be adjusted for magnetic panel mounting when required. Specify panel material and thickness.

♦ Meets MIL-M-10304 specification

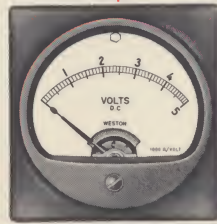
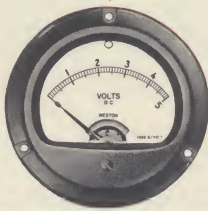
NOTE: Unless otherwise stated scales will have white background with black figures and division lines.

CORMAG® Self-shielding core magnet moving coil mechanism.

WESTON STOCK PANEL

2½"

201 SERIES

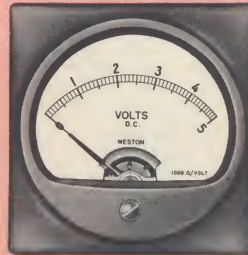


2520 SERIES



3½"

301 SERIES

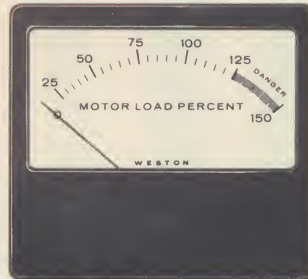
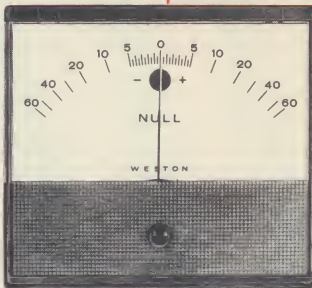


2530 SERIES



4½"

SPECIAL METERS



EDGEWISE METERS

111 SERIES THIN LINE



See page 18

1201 SERIES FLAT SCALE



See page 12



1209 SERIES



DISCOUNTS

All prices shown are subject to the following discounts:

Quantity	Discount
1- 9	NET
10-24	10%
25-49	20%

Prices are subject to change without notice

METER SELECTOR

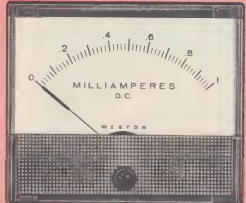
SIZES
2½"

1920 SERIES



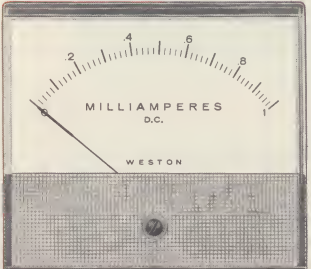
3½"

1930 SERIES



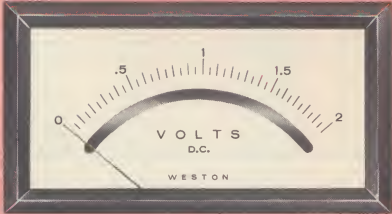
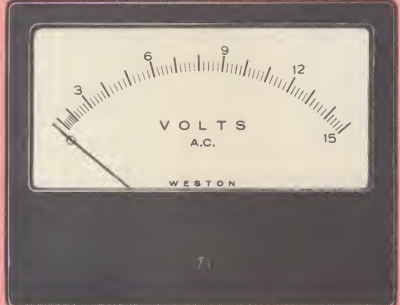
4½"

1940 SERIES



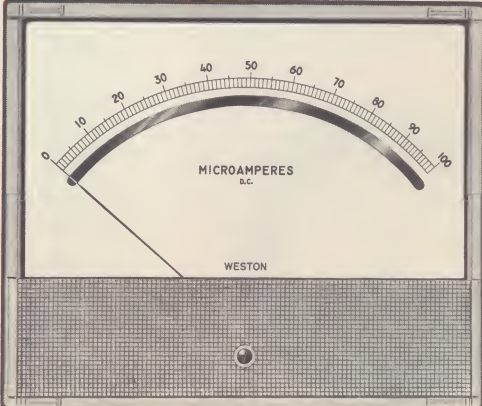
5½"

1950 SERIES



7½"

1970 SERIES



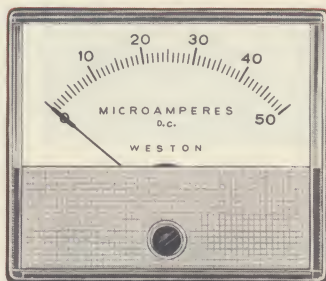
SEE
BACK
OF
COVER
FLAP
FOR
SPECS



201 SERIES — ROUND CASE



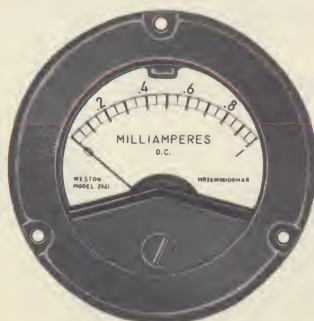
201 SERIES — SQUARE CASE



1920 SERIES — PLASTIC FRONT
(See Page 17 for Mounting Bezels)



1920 SERIES — BAKELITE FRONT



2520 SERIES — RUGGEDIZED

2½" DC VOLTMETERS

MODEL→	201		1921		2521 (Ruggedized)	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1.5	↑	\$13.90	↑	—	↑	—
2		—		\$15.40		—
3		13.90		—		—
5		13.90		15.40		—
8		13.90		—		—
10	1000 Ohms	13.90	1000 Ohms	15.40	1000 Ohms	\$24.20
15		13.90		15.40		—
20		—		—		—
25		13.90		15.40		—
30		13.90		15.40		—
50	↓	13.90	↓	15.40	↓	24.20
100		13.90		15.40		—
150		13.90		15.40		—
200		14.40		15.40		—
250		14.40		—		—
300	↓	14.40	↓	15.40	↓	25.10
500		14.90		15.40		—

2½" DC AMMETERS

MODEL→	201		1921		2521 (Ruggedized)	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1	↑	\$13.40	↑	\$14.60	↑	—
1.5		13.40		—		—
2		13.40		14.60		—
3		13.40		—		—
5		13.40		14.60		\$21.85
10	Approx. 50 mv Drop	13.40	Approx. 50 mv Drop	14.60	Approx. 50 mv Drop	21.85
15		14.40		—		—
20		14.40		14.60		—
25		—		—		—
30		14.40		14.60		—
50	↓	14.40	↓	—	↓	—
100*		13.40		14.60		—
200*		13.40		14.60		—
300*		13.40		—		—
500*		13.40		—		—

* 50 MV range to be used with external shunts and .065 ohm leads . . . see page 15.

2½" DC MILLIAMMETERS

MODEL→	201		1921		2521 (Ruggedized)	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1	100	\$13.40	88	\$14.60	95	\$20.95
2	40	13.40	45	14.60	—	—
5	6	13.40	8.5	14.60	—	—
10	2.5	13.40	2.5	14.60	—	—
15	2.5	13.40	2.3	14.60	—	—
20	2.5	13.40	2.2	14.60	—	—
30	2.5	13.40	—	—	—	—
50	2	13.40	2.0	14.60	—	—
100	1	13.40	1.0	14.60	—	—
150	0.66	13.40	—	—	—	—
200	—	—	0.5	14.60	0.25	21.80
300	—	—	0.33	14.60	—	—
500	0.2	13.40	0.2	14.60	—	—
1-0-1	40	13.40	—	—	—	—
100-0-100	1	13.40	—	—	—	—

Note: All Resistance Values Are Approximate.

2½" DC MICROAMMETERS

MODEL→	201		206		1921		2521 (Ruggedized)	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Resis.	Price
20	—	—	1480	\$25.50	—	—	3000	\$29.30*
50	4150	\$19.30	1175	23.40	4800	\$18.60	1175	23.95
100	870	16.40	660	21.50	1225	17.40	1000	23.00
200	600	13.90	—	—	600	16.60	600	21.85
500	160	13.90	—	—	240	15.60	—	—
25-0-25	4150	19.30	—	—	—	—	—	—
50-0-50	870	16.40	—	—	1225	17.40	1000	23.00
100-0-100	600	13.90	—	—	600	16.60	—	—
500-0-500	100	13.40	—	—	88	14.60	—	—

* Recommended for use in horizontal position.

2½" AC VOLTMETERS

MODEL→	204 (Iron Vane) 25-125 cps		1922 Rect. Type		1924 (Iron Vane) 25-125 cps		2524 (Iron Vane) 25-125 cps	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Pwr. Cons.	Price
3	—	—	↑ 1000 Ohms Per Volt ↓	—	6	\$15.00	—	—
5	26	\$13.35		\$20.20	—	—	—	—
7.5	—	—		—	37	15.00	—	—
10	100	13.35		—	66.5	15.00	—	—
15	250	13.35		20.20	150	15.00	—	—
25	—	—	1000 Ohms Per Volt ↓	—	500	15.00	—	—
30	—	—		—	600	15.00	—	—
50	2124	13.35		—	1665	15.00	—	—
75	5074	13.35		—	3750	15.00	—	—
100	10,065	13.35		—	—	—	2 va	—
150	20,295	13.75		20.20	15,000	15.00	max.	\$24.65*
300	81,550	13.75		20.20	60,000	15.00	2 va	25.10*
500	—	—		—	100,000	15.00	max.	—

* 150 Volts A-C (400 cps)...\$27.45; 300 Volts A-C (400 cps)...\$27.90

2½" AC AMMETERS

MODEL→	204 (Iron Vane) 25-500 cps		208 (Thermo)		1924 (Iron Vane) 25-500 cps		2524 (Iron Vane) Ruggedized	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Resis.	Price
1	.130	\$12.95	—	—	.25	\$14.35	—	—
2	.026	12.95	—	—	.062	14.35	—	—
3	.013	12.95	—	—	.025	14.35	—	—
5	.005	12.95	—	\$28.40	.016	14.35	.016	\$20.95
10	.0014	12.95	—	—	.0045	14.35	—	—
15	.0015	12.95	—	—	.0025	14.35	—	—
20	.0005	12.95	—	—	.0011	14.35	—	—
25	—	12.95	—	—	—	—	—	—
30	.0004	12.95	—	—	.00056	14.35	—	—
50	.0002	12.95	—	—	.00027	14.35	—	—
100*	—	—	—	—	.016	14.35	—	—
200*	—	—	—	—	.016	14.35	—	—
300*	—	—	—	—	.016	14.35	—	—

* 5 ampere range for use with current transformer . . . see page 16.

2½" AC MILLIAMMETERS

MODEL→	204 (Iron Vane)		1922 (Rect. Type)		1924 (Iron Vane)	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1	—	—	475	\$19.30	—	—
10	—	—	—	—	2550	\$14.35
50	—	—	—	—	100	14.35
100	—	—	—	—	25	14.35
200	—	—	—	—	6.33	14.35
250	—	—	—	—	4	14.35
500	0.42	\$12.95	—	—	1.0	14.35

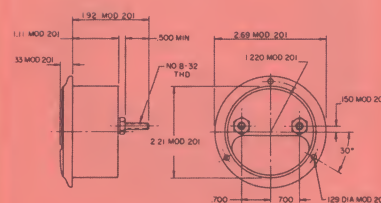
2½" AC MICROAMMETERS

MODEL →	1922 (Rect. Type)							
RANGE	Resis.	Price	RANGE	Resis.	Price	RANGE	Resis.	Price
100	4000	\$22.50	200	2000	\$22.50	500	800	\$22.50

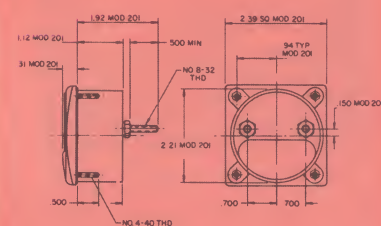
Note: All Resistance Values Are Approximate.

GENERAL DIMENSIONS

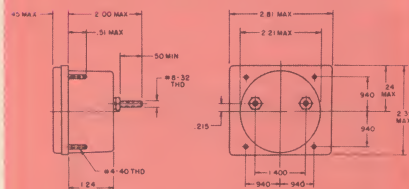
(ALL DIMENSIONS ARE APPROXIMATE)



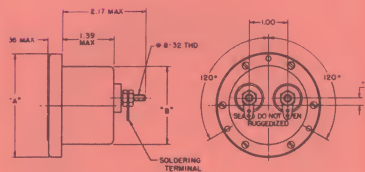
201 SERIES — ROUND CASE



201 SERIES — SQUARE CASE



1920 SERIES



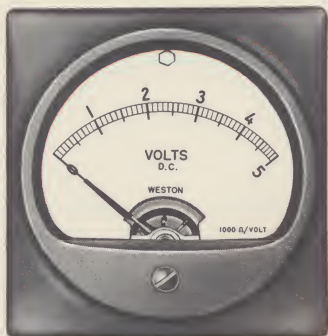
MODEL	"A" DIA	"B" DIA	"C" DIA	"D" DIA	"E" DIA	"F" DIA
2521-2-4	2.69 MAX	2.05 MAX	.19	1.22 R	2.220	1.25

2520 SERIES — RUGGEDIZED

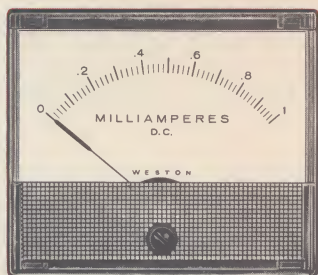
SEE
BACK
OF
COVER
FLAP
FOR
SPECS



301 SERIES — ROUND CASE



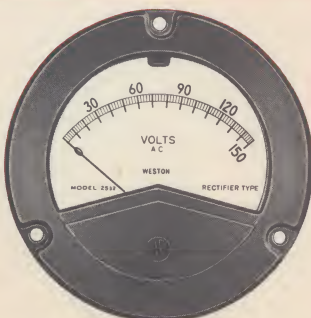
301 SERIES — SQUARE CASE



1930 SERIES — PLASTIC FRONT †



1930 SERIES — BAKELITE FRONT



2530 SERIES — RUGGEDIZED

3½" DC VOLTMETERS

MODEL➤	301		1931 Pivot & Jewel		1931 T Taut Band		2531 Ruggedized	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Resis.	Price
1.5	↑	\$14.90	↑	—	↑	—	↑	—
2		—		\$15.90		\$17.40		—
3		14.90		—		—		—
5		14.90		15.90		—		—
8	↑	14.90	↑	—	↑	—	↑	—
10		14.90		15.90		—		—
15		14.90		15.90		17.40		—
25		14.90		15.90		—		—
30		14.90		15.90		17.40		—
50		14.90		15.90		17.40		\$26.05
100	↓	14.90	↓	15.90	↓	17.40	↓	—
150		14.90		15.90		17.40		—
200		15.40		15.90		—		—
250		15.40		—		—		—
300		15.40		15.90		17.40		26.95
500		15.40		15.90		17.40		—
1 kv	↓	19.80	↓	—	↓	—	↓	—

3½" DC AMMETERS

MODEL➤	301		1931 Pivot & Jewel		1931 T Taut Band		2531 Ruggedized	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Resis.	Price
1	↑	\$14.40	↑	\$15.10	↑	\$16.60	—	—
1.5		14.40		—		—	—	—
2		14.40		15.10		16.60	—	—
3		14.40		—		—	—	—
5		14.40		15.10		16.60	0.01	\$23.70
8	↑	—	↑	—	↑	—	—	—
10		14.40		15.10		16.60	—	—
15		15.40		—		—	—	—
20		15.40		15.10		16.60	—	—
25		—		15.10		—	—	—
30		15.40		15.10		16.60	—	—
50	↓	15.40	↓	—	↓	—	—	—
75*		14.40		—		—	—	—
100*		14.40		15.10		—	—	—
150*		14.40		—		—	—	—
200*		14.40		15.10		—	—	—
300*		14.40		15.10		—	—	—
500*	↓	14.40	↓	15.10	↓	—	—	—
10-0-10		15.40		—		—	—	—
30-0-30		15.40		—		—	—	—
50-0-50		15.40		—		—	—	—

* 50 MV range to be used with external shunts and .065 ohm leads . . . see page 15.

† SEE PAGE 17 FOR MOUNTING BEZELS
AND ILLUMINATION KITS.

Note: All Resistance Values Are Approximate.

3½" DC MILLIAMMETERS

MODEL➤	301		1931 Pivot & Jewel		1931 T Taut Band		2531 Ruggedized	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Resis.	Price
1	27	\$14.40	88	\$15.10	34.5	\$16.60	95	\$22.80
1	88	14.40	—	—	—	—	—	—
1.5	88	14.40	—	—	—	—	—	—
2	45	14.40	45	15.10	—	—	—	—
3	45	14.40	—	—	—	—	—	—
5	8	14.40	8.5	15.10	3.3	16.60	—	—
10	2.5	14.40	2.5	15.10	—	—	2.7	22.80
15	2.5	14.40	—	—	—	—	—	—
20	2.5	14.40	2.2	15.10	—	—	—	—
25	2.5	14.40	—	—	—	—	—	—
30	2.5	14.40	—	—	—	—	—	—
50	2	14.40	2.0	15.10	1	16.60	—	—
100	1	14.40	1.0	15.10	—	—	0.5	23.70
150	0.66	14.40	—	—	—	—	—	—
200	0.5	14.40	0.5	15.10	2.5	16.60	—	—
300	0.33	14.40	0.33	15.10	—	—	—	—
500	0.2	14.40	0.2	15.10	1	16.60	0.1	23.70
1-0-1	45	14.40	—	—	—	—	—	—
10-0-10	2.5	14.40	—	—	—	—	—	—
50-0-50	2	14.40	—	—	—	—	—	—
100-0-100	1	14.40	—	—	—	—	—	—

3½" DC MICROAMMETERS (more below)

MODEL➤	301		306		2531 Ruggedized	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
20	5500	\$23.70*	1480	\$26.40	3000	\$31.15*
30	5500	22.50*	—	—	—	—
50	4800	20.30	1175	23.40	1175	26.75
100	1230	17.30	660	21.50	1000	25.80
200	600	14.90	55	21.50	600	24.65
500	230	14.90	—	—	—	—
10-0-10	5500	23.70	—	—	—	—
25-0-25	4800	20.30	—	—	—	—
50-0-50	1230	17.30	—	—	985	25.80
100-0-100	600	14.90	—	—	—	—
500-0-500	88	14.40	—	—	—	—

* Recommended for use in horizontal position.

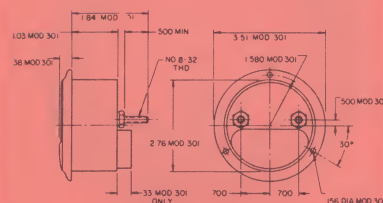
3½" DC MICROAMMETERS (continued)

MODEL➤	1931 Pivot & Jewel		1931 T Taut Band		1936 T Taut Band	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
5	—	—	—	—	13,500	\$32.00
10	—	—	—	—	5,300	28.00
20	—	—	—	—	2,100	24.00
50	4800	\$19.10	1950	\$21.00	—	—
100	1225	17.90	538	19.70	—	—
200	600	17.10	440	18.80	—	—
500	240	16.10	—	—	—	—
50-0-50	1225	17.90	—	—	—	—
100-0-100	600	17.10	—	—	—	—
500-0-500	88	15.10	—	—	—	—

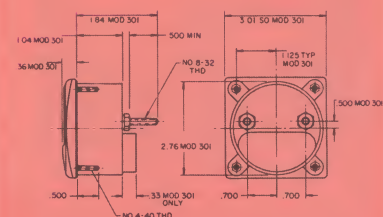
3½" AC CONTINUED NEXT PAGE

Note: All Resistance Values Are Approximate.

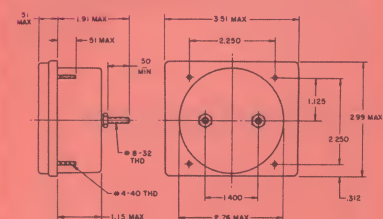
GENERAL DIMENSIONS (ALL DIMENSIONS ARE APPROXIMATE)



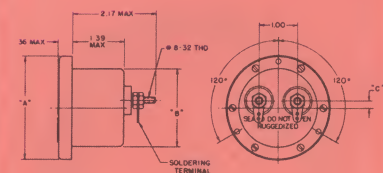
301 SERIES — ROUND CASE



301 SERIES — SQUARE CASE



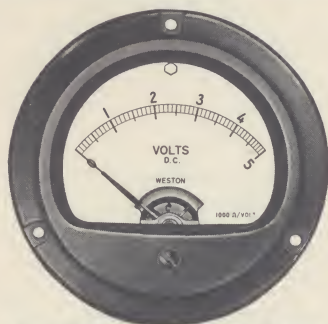
1930 SERIES



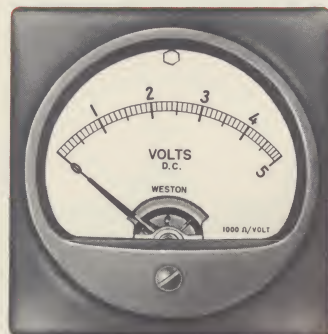
2530 SERIES — RUGGEDIZED

MODELS	"A" DIA	"B" DIA	"C"	"D"	"E" DIA	"F" DIA
2531-2-4	3.50 MAX	2.76 MAX	.00	1.58 R	2.820	.150

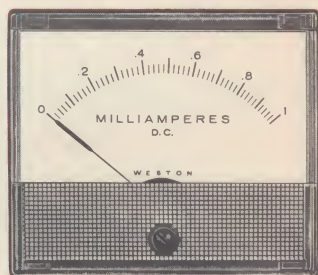
SEE
BACK
OF
COVER
FLAP
FOR
SPECS



301 SERIES — ROUND CASE



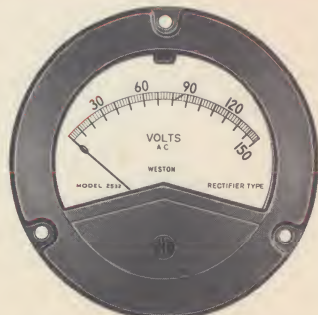
301 SERIES — SQUARE CASE



1930 SERIES — PLASTIC FRONT †



1930 SERIES — BAKELITE FRONT



2530 SERIES — RUGGEDIZED

3½" AC METERS

3½" AC VOLTMETERS (more below)

MODEL	302 (Rect. Type)		304 (Iron Vane) 25-125 cps		304 (Iron Vane) 400-cps	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1 †	↑	\$21.30	—	—	—	—
1.5		—	3	\$14.10	—	—
3		—	15	14.10	—	—
5		20.70	26	14.10	—	—
7.5		—	—	—	—	—
10	1000 Ohms Per	20.70	100	14.10	—	—
15		20.70	250	14.10	—	—
25		—	—	—	—	—
30		20.70	790	14.10	660	\$16.75
50	Volt ↓	20.70	2124	14.10	—	—
50 †		21.30	—	—	—	—
75		—	5074	14.10	—	—
100		20.70	10,065	14.10	—	—
130		—	13,065	14.45	9412	16.75
150		20.70	20,295	14.45	15,565	16.75
300		21.30	81,550	14.45	42,295	16.75
500		—	131,550	17.50	—	—

† 2000 ohms per volt.

3½" AC VOLTMETERS (continued)

MODEL	1932 (Rect. Type)		1934 (Iron Vane) 25-125 cps		2534 (Iron Vane) Ruggedized 25-125 cps	
RANGE	Resis.	Price	Resis.	Price	Pwr. Cons.	Price
1	↑	—	—	—	—	—
1.5		—	—	—	—	—
3		—	6	\$15.40	—	—
5		20.70	—	—	—	—
7.5		—	37	15.40	—	—
10	1000 Ohms Per Volt	20.70	66.5	15.40	—	—
15		20.70	150	15.40	—	—
25		—	500	15.40	—	—
30		—	—	—	—	—
50	↓	—	1665	15.40	—	—
75		—	—	—	—	—
100		—	—	—	—	—
130		—	—	—	—	—
150		20.70	15,000	15.40	2 va max.	26.05*
300		—	60,000	15.40	2 va max.	26.50
500		—	—	—	—	—

* 150 Volts AC (400 cps)... \$28.85

† SEE PAGE 17 FOR MOUNTING BEZELS
AND ILLUMINATION KITS.

Note: All Resistance Values Are Approximate.

3½" AC AMMETERS

MODEL→	304 Iron Vane 25-500 cps		308 Thermo		308 Expanded Scale		1934 Iron Vane		2534 Iron Vane Ruggedized	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price	Resis.	Price	Pwr. Cons.	Price
1	0.130	\$13.75	—	\$29.30	—	\$37.10	.25	\$14.65	—	—
1.5	0.055	13.75	—	—	—	—	—	—	—	—
2	0.026	13.75	—	—	—	—	.062	14.65	—	—
3	0.013	13.75	—	29.30	—	37.10	.025	14.65	—	—
5	0.005	13.75	—	29.30	—	37.10	.016	14.65	2 va max.	\$22.80
8	—	—	—	29.30	—	37.10	—	—	—	—
10	0.0014	13.75	—	29.30	—	37.10	.0045	14.65	—	—
15	0.0015	13.75	—	29.30	—	37.10	.0025	14.65	—	—
20	0.0005	13.75	—	—	—	37.10	.0011	14.65	—	—
25	—	—	—	—	—	—	.0011	14.65	—	—
30	0.0004	13.75	—	—	—	—	—	—	—	—
50	0.0002	13.75	—	—	—	—	.00027	14.65	—	—
100*	0.005	13.75	—	—	—	—	.016	14.65	—	—
200*	0.005	13.75	—	—	—	—	.016	14.65	—	—
300*	0.005	13.75	—	—	—	—	.016	14.65	—	—

* 5 ampere range for use with current transformer . . . see page 16.

3½" AC MILLIAMMETERS

MODEL→	302 (Rect. Type)		304 (Iron Vane)		1934 (Iron Vane)	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
0.5	790	\$20.70	—	—	—	—
1	470	20.70	—	—	—	—
2	270	20.70	—	—	—	—
5	150	20.70	—	—	—	—
10	—	—	—	—	2550	\$14.65
50	—	—	34	\$13.75	100	14.65
100	—	—	8.5	13.75	25	14.65
200	—	—	—	—	6.33	14.65
250	—	—	—	—	4.0	14.65
500	—	—	0.42	13.75	1.0	14.65

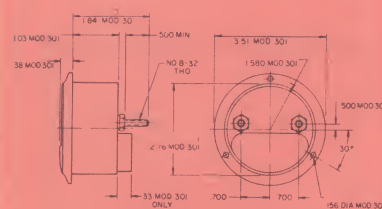
3½" AC MICROAMMETERS

MODEL→	302	
RANGE	Resis.	Price
100	3400	\$24.40
500	790	20.70

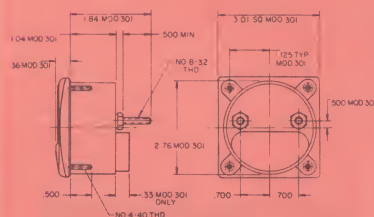
Note: All Resistance Values Are Approximate.

GENERAL DIMENSIONS

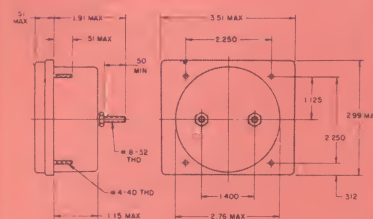
(ALL DIMENSIONS ARE APPROXIMATE)



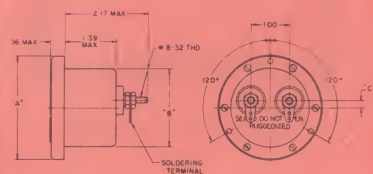
301 SERIES — ROUND CASE



301 SERIES — SQUARE CASE



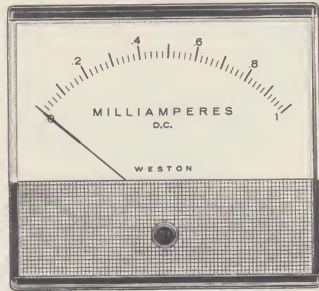
1930 SERIES



MODELS	"A" DIA	"B" DIA	"C"	"D"	"E" DIA	"F" DIA
2531-E-4	3.50 MAX	2.76 MAX	00	1.58 R	2.820	150

2530 SERIES — RUGGEDIZED

SEE
BACK
OF
COVER
FLAP
FOR
SPECS



1940 SERIES — PLASTIC FRONT

4½" DC VOLTMETERS

MODEL→	1941 (2%) Pivot & Jewel		1941 T (2%) Taut Band		1941 T (1%)† Taut Band	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
2	↑	\$16.90	↑	\$18.50	↑	\$24.65
5	↑	16.90	↑	—	↑	24.65
10	↑	16.90	↑	—	↑	24.65
15	↑	16.90	↑	18.50	↑	24.65
25	1000	16.90	1000	—	1000	—
30	Ohms	16.90	Ohms	18.50	Ohms	24.65
50	Per	16.90	Per	18.50	Per	24.65
100	Volt	16.90	Volt	18.50	Volt	24.65
150	↓	16.90	↓	18.50	↓	24.65
200	↓	16.90	↓	—	↓	24.65
300	↓	16.90	↓	18.50	↓	24.65
500	↓	16.90	↓	18.50	↓	24.65

† 1% accuracy supplied with knife edge pointer and mirror scale.



1940 SERIES — BAKELITE FRONT

4½" DC AMMETERS

MODEL→	1941 (2%) Pivot & Jewel		1941 T (2%) Taut Band		1941 T (1%)† Taut Band	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1	↑	\$16.10	↑	\$17.70	↑	\$23.90
2	↑	16.10	↑	17.70	↑	23.90
5	↑	16.10	↑	17.70	↑	23.90
10	Approx.	16.10	Approx.	17.70	Approx.	23.90
20	50 mv	16.10	50 mv	17.70	50 mv	23.90
25	Drop	16.10	Drop	—	Drop	—
30	↓	16.10	↓	17.70	↓	23.90
100*	↓	16.10	↓	—	↓	—
200*	↓	16.10	↓	—	↓	—

* Use with external shunts and .065 ohm leads . . . see page 15.

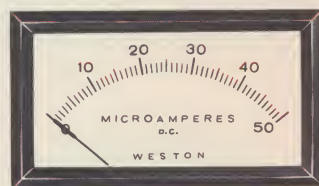
† 1% accuracy supplied with knife edge pointer and mirror scale.

4½" DC MICROAMMETERS

MODEL→	1941 (2%) Pivot & Jewel		1946 (1%)† Pivot & Jewel		1941 T (2%) (1%) Taut Band			1946 T (1%)† Taut Band	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price 2%	Price 1%†	Resis.	Price
5	—	—	—	—	—	—	—	13,500	\$35.00*
10	—	—	—	—	—	—	—	5,300	31.00*
20	—	—	5400	\$24.00	—	—	—	2,100	27.00*
50	2500	\$20.10	2180	30.50	950	\$22.10	—	870	33.60
100	2500	18.80	870	29.80	950	20.70	\$26.75	320	32.70
200	850	18.10	—	—	350	19.90	26.30	—	—
500	240	17.10	—	—	40	18.80	24.80	—	—
25-0-25	2500	20.10	—	—	—	—	—	—	—
50-0-50	2500	18.80	—	—	—	—	—	—	—
100-0-100	850	18.10	—	—	—	—	—	—	—
500-0-500	115	16.10	—	—	—	—	—	—	—

* 2% accuracy only on these ranges.

† 1% accuracy supplied with knife edge pointer and mirror scale.



1940 SERIES ½ BEZEL

SEE PAGE 17 FOR
MOUNTING BEZELS
AND ILLUMINATION KITS.

GENERAL DIMENSIONS

(ALL DIMENSIONS ARE APPROXIMATE)

4½" DC MILLIAMMETERS

MODEL→	1941 (2%) Pivot & Jewel		1941 T (2%) Taut Band		1941 T (1%) Taut Band	
RANGE	Resis.	Price	Resis.	Price	Resis.	Price
1	115	\$16.10	12.5	\$17.70	12.5	\$23.90
2	16	16.10	—	—	4.9	23.90
3	16	16.10	—	—	—	—
5	11	16.10	3.0	17.70	3.0	23.90
10	2.7	16.10	—	—	2.4	23.90
15	2.7	16.10	—	—	—	—
20	2.7	16.10	—	—	2.4	23.90
50	2	16.10	2	17.70	2	23.90
100	1	16.10	—	—	1	23.90
200	0.5	16.10	0.5	17.70	0.5	23.90
300	0.33	16.10	—	—	—	—
500	0.2	16.10	0.2	17.70	0.2	23.90

† 1% accuracy supplied with knife edge pointer and mirror scale.

4½" AC VOLTMETERS

MODEL→	1942 Rect. Type		1944 (Iron Vane)* 25-125 cps	
RANGE	Resis.	Price	Resis.	Price
3	1000	—	10.5	\$16.15
5		\$21.70	—	—
7.5		—	35	16.15
10		21.70	66.5	16.15
15		—	143	16.15
25	Ohms Per Volt	—	500	16.15
30		—	560	16.15
50		—	1665	16.15
100		—	6700	16.15
150		21.70	14,300	16.15
300	—	—	56,000	16.15
500		—	93,500	16.15

* Can be supplied at a fixed frequency of 400 cps ± 10% at \$3.25 list extra.

4½" AC AMMETERS

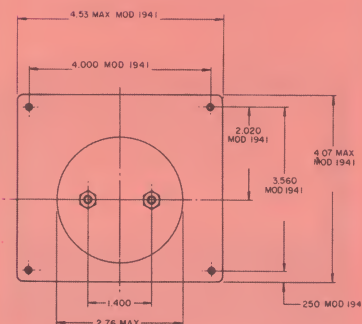
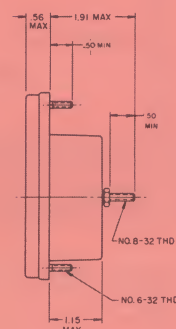
MODEL→	1944 (Iron Vane) 25-500 cps	
RANGE	Resis.	Price
1	.25	\$15.40
2	.062	15.40
5	.016	15.40
10	.0045	15.40
20	.0011	15.40
25	.0011	15.40
30	.00056	15.40
50	.00027	15.40
100*	.016	15.40

* 5 ampere range for use with current transformer . . . see page 16.

4½" AC MILLIAMMETERS

MODEL→	1944 (Iron Vane) 25-500 cps	
RANGE	Resis.	Price
10	2550	\$15.40
50	100	15.40
200	6.33	15.40
500	1.0	15.40

Note: All Resistance Values Are Approximate.

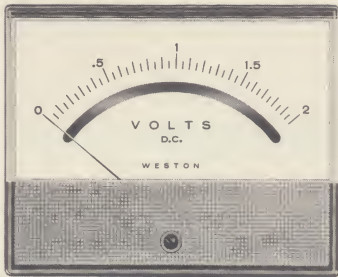


1940 SERIES

SEE PAGE 17
FOR
MOUNTING BEZELS
AND
ILLUMINATION KITS

4½"

SEE
BACK
OF
COVER
FLAP
FOR
SPECS



1950 SERIES — PLASTIC FRONT

(See Page 17 for Mounting Bezels and Illumination Kits)



1950 SERIES — BAKELITE FRONT

5 1/2" DC VOLTMETERS

MODEL →	1951 T (1%)† Taut Band	
RANGE	Resis.	Price
5	1000 Ohms Per Volt	\$28.60
15		28.60
30		28.60
50		28.60
150		28.60

5 1/2" DC AMMETERS

MODEL →	1951 T (1%)† Taut Band	
RANGE	Resis.	Price
1	50 mv drop	\$28.60
10		28.60

5 1/2" DC MICROAMMETERS

MODEL →	1951 T (1%)† Taut Band		1956 T (2%) Taut Band	
RANGE	Resis.	Price	Resis.	Price
5	—	—	13,500	\$49.00
10	—	—	5,300	41.00
20	—	—	2,100	38.90
100	950	\$31.80	—	—
200	350	30.80	—	—

5 1/2" DC MILLIAMMETERS

MODEL →	1951 T (1%)† Taut Band	
RANGE	Resis.	Price
1	12.5	\$27.80
10	2.4	27.80
100	1	27.80

† 1% accuracy supplied with knife edge pointer and mirror scale.

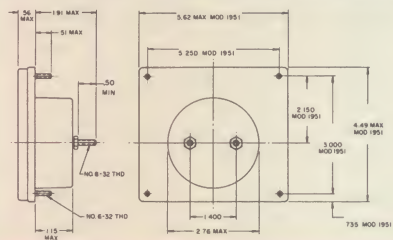
5 1/2" AC VOLTMETERS

MODEL →	1954 (2%) (Iron Vane) * 25-125 cps	
RANGE	Resis.	Price
3	10.5	\$20.70
15	143	20.70
30	560	20.70
150	14,300	20.70
300	56,000	20.70

* Can be supplied at a fixed frequency of 400 cps ± 10% at \$3.25 list extra.

5 1/2" AC AMMETERS

MODEL →	1954 (2%) 25-500 cps	
RANGE	Resis.	Price
1	.25	\$19.95
5	.016	19.95



EDGEWISE METERS 1201 SERIES (Projected Moving Pointer)



Model 1201 is a true flat edgewise instrument with the projection path so arranged that an essentially linear scale is obtained. The standard projected pointer will appear white but can be colored on special order. ■ Since the pointer is projected on the same plane as the scale divisions, parallax is completely eliminated. Special Feature: Filters may be placed behind the scale so that the pointer will change color at a fixed point.

DC MILLIAMMETERS

MODEL →	1201 (1%)	
RANGE	Resis.	Price (Hor.)
1*	18.8	\$55.50
10	2.3	55.50
20	5.0	55.50
50	2.0	57.00
500	0.2	58.00

DC MICROAMMETERS

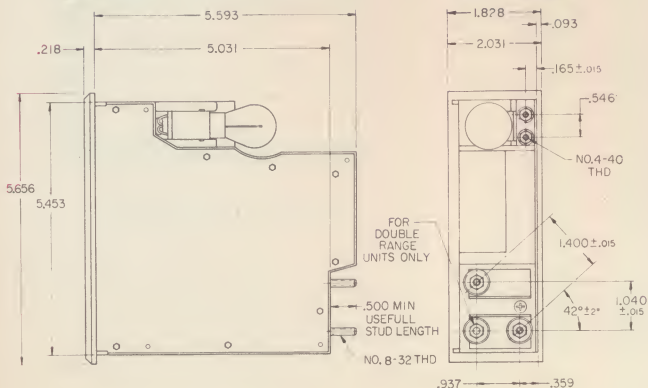
MODEL →	1201 (1%)	
RANGE	Resis.	Price (Hor.)
50	2300	\$61.50
100	640	60.00
200	415	58.50
500	88	57.00
50-0-50	640	60.00

AC VOLTMETERS (Rectifier Type) 2% ACCURA

MODEL →	1202 Rect. Type (2%)	
RANGE	Resis.	Price (Hor.)
150	1000Ω/V	\$63.50
300	1000Ω/V	64.00

DC VOLTMETERS

MODEL →	1201 (1%)	
RANGE	Resis.	Price (Hor.)
1	↑	\$58.00
5	1000	58.00
10	Ohms	58.00
20	Per Volt	58.00
50	↓	58.00
100	↓	58.00
500	↓	58.00



7 1/2" DC METERS

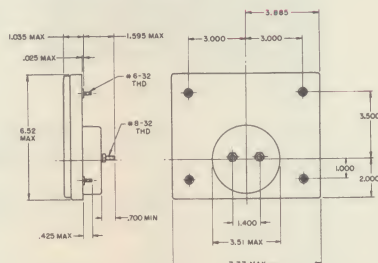
7 1/2" DC MICROAMMETERS

MODEL→	1971 (1%) Pivot & Jewel		1976 (1%)	
RANGE	Resis.	Price	Resis.	Price
50	—	—	2720	\$56.40*
100	4650	\$45.20	—	—
200	2000	42.20	—	—

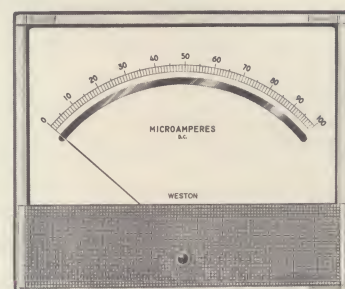
* 1/2% accuracy available with knife-edge pointer and mirror scale at \$63.70 list from stock.

7 1/2" DC MILLIAMMETERS

MODEL→	1971 T (1%) Taut Band	
RANGE	Resis.	Price
1	95	44.30



TYPICAL 1971 1% Accuracy
1/2 BEZEL



TYPICAL 1976 1/2% Accuracy with
knife-edge pointer and Mirror Scale

SEE PAGE 17 FOR MOUNTING BEZELS
AND ILLUMINATION KITS.

THE 1209 SERIES... 8" OF SCALE INTO 2 1/2" FRONT (Projected Moving Scale Meter)

DC VOLTMETERS

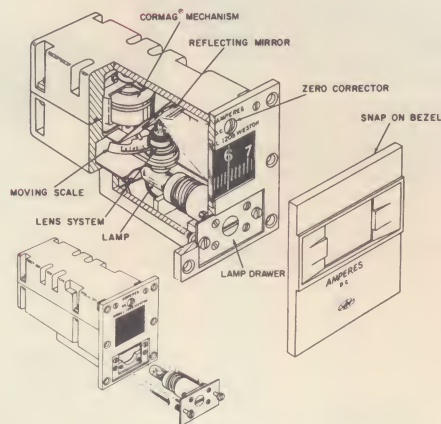
MODEL→	1209 (1%)	
RANGE	Resis.	Price
50 MV	5 Ohms	\$57.00
1	1000 Ohms Per Volt	58.00
2		58.00
5		58.00
10		58.00
20		58.00
50		58.00
100		58.00
200		58.00
500		58.00

DC MILLIAMMETERS

MODEL→	1209 (1%)	
RANGE	Resis.	Price
1	21	\$55.50
2	8.6	55.50
5	3.96	55.50
10	2.3	55.50
20	2.2	55.50
50	2.0	57.00

DC MICROAMMETERS

MODEL→	1209 (1%)	
RANGE	Resis.	Price
50	5700	\$61.50
100	1160	60.00
200	231	58.50
500	73	57.00
50-0-50	1160	60.00

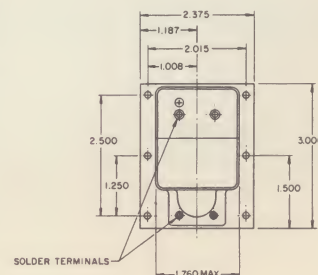
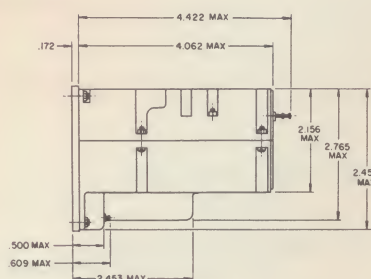


HOW THE PMS MODEL 1209 WORKS

A simple optical system projects a moving scale onto a coated window. The scale is rotated by a self-shielded Weston Cormag mechanism of proved design and reliability. Pivot roll is eliminated in PMS panel meters, because the mechanical axis is vertical.



Standard meters use black background scales with white figures. White background scales available.



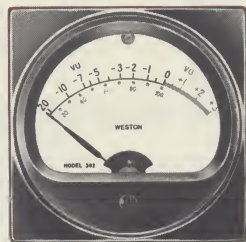
Note: All Resistance Values Are Approximate.

5 1/2"

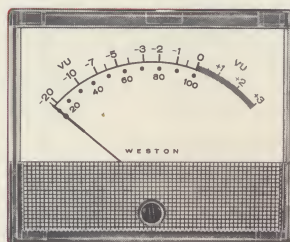
7 1/2"

WESTON SPECIAL METERS

VOLUME LEVEL METERS



MODEL 302 TYPE 30 A



MODEL 1932 TYPE 30 A



MODEL 1942 TYPE 30 B

Weston VU Meters are available with a choice of two (2) scales (except 1922 and 1932). Type A stresses the level in VU and is used largely in monitoring wire lines. Type B emphasizes percent use of transmitter output and is the standard for broadcast service. These meters meet all the electrical and ballistic specifications of ASA C16.5. The VU meter is designed to read zero VU or 100% with 1.228 volts applied to the meter and a 3600 ohms series resistor. This represents 4 DB above 1 MW in 600 ohms.

Model 302 Type 30 (Scale A or B)
Rd. or Sq. Bakelite Case **\$27.40**
(See page 7 for dimensions)

Model 1922 Type 30 (Scale A)
Bakelite or Plastic Front* **25.50**
(See page 5 for dimensions)

Model 1932 Type 30 (Scale A)
Bakelite or Plastic Front* **26.00**
(See page 7 for dimensions)

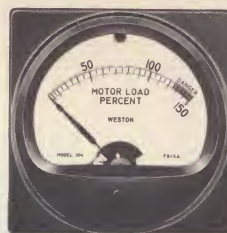
Model 1942 Type 30 (Scale A or B)
Bakelite or Plastic Front* **27.00**
(See page 11 for dimensions)

*See page 17 for illumination kit (1922, 1932, 1942 only).

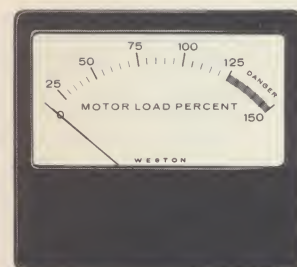
% LOAD METERS

The Percent Load Meters are basically 5 ampere ammeters, for use with 5 ampere secondary current transformers having scales captioned in "Motor Load-Percent". The scale range is 0-150%, with the section 125-150% blocked off in red to warn of overloading with the meter connected to the transformer secondary. A continuous visible check of load conditions on 1, 2 or 3 phase and 2, 3 or 4 wire a-c motors of any horsepower, commercial frequency or voltage is provided.

The transformer ratio must be adjusted to produce 5 amperes output from secondary when 150% of rated motor current is reached. Request Circular 01-405 on Weston Model 605 and 607 current transformers for a more complete explanation.



Model 304 **\$13.75**
Round or Square Bakelite Case
(See Page 7 For Dimensions)



Model 1934 **\$14.65**
1944 **15.40**
Plastic or Bakelite Front
(See Pages 8 & 11 For Dimensions)

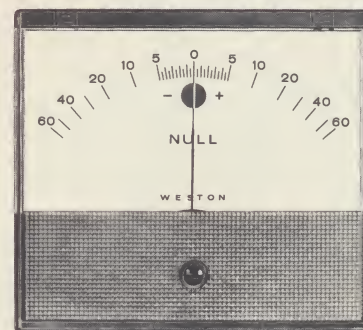
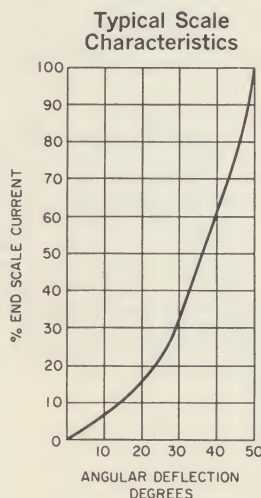
NULL METERS

Model 1936T (Taut Band) **\$35.50***
(See page 7 for dimensions.)

Model 1946T (Taut Band) **\$36.50***
(See page 11 for dimensions.)

*Resistance is 1700 ohms. End scale value 60-0-60 μ a \pm 20%. Sensitivity at null point 0.5 μ a/degree (0.4 μ a/mm).

SEE PAGE 17 FOR
MOUNTING BEZELS
AND ILLUMINATION KITS.



ACCESSORIES

SHUNTS (50 MV DROP)

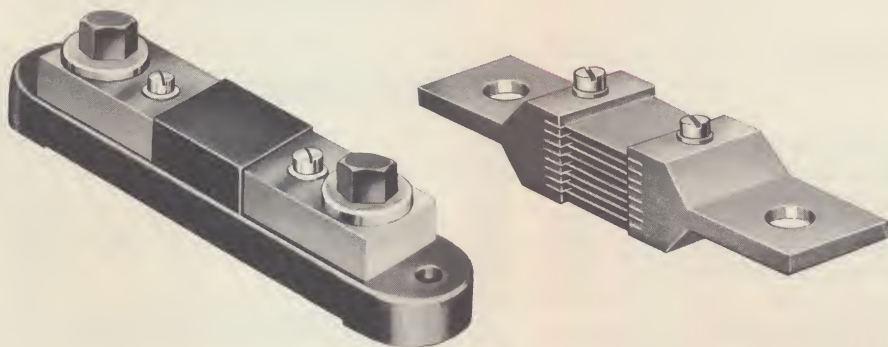
Only currents up to approximately 50 milliamperes can be taken into a moving coil, hence special provisions are made where current ranges exceed that limit. Direct current meters of ranges in excess of 50 milliamperes require the use of a parallel resistance circuit formed by one or several shunts. Where these ranges are moderate the shunts are usually self-contained. On higher ranges the shunts become physically large and convert more than a few watts into heat, so that they are used as accessories, external to the meter. (The shunt is a current by-pass).

Weston high and low range shunts have liberal allowance for overload capacity and adequate contact surface. They are adjusted for a 50 millivolt drop.

STANDARD LEADS

No. 18 plastic covered twisted leads, .065 ohm, 5' long, 10-32 terminal for shunt connection on one end and tinned on other end. For other leads correspondence is invited.

P/N 131442 \$1.50



Range In Amps	Dim A	Dim B	Dim C	Dim D
500	1.250	.531	5.250	7.000
600	1.500	.531	5.250	7.000
750	2.000	.531	5.250	7.000
800	2.000	.531	5.250	7.000

500 to 800 amperes

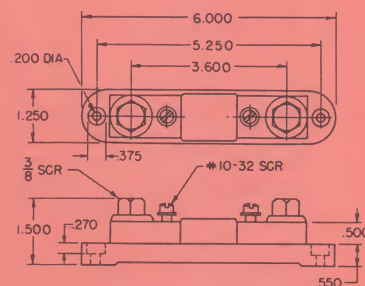
Range	No. of Blades	No. of Alloy Strips	A	B	C	D	E	G	H	J	K
			In.	In.	In.	In.	In.	In.	In.	In.	In.
1000	2	4	3.0	8.96	1.65	2.34	7.46	1.5	0.75	0.75	0.531
1200	2	4	3.0	8.96	1.65	2.34	7.46	1.5	0.75	0.75	0.531
1500	3	5	3.0	8.96	2.01	2.34	7.46	1.5	0.75	0.75	0.531
2000	3	5	4.0	8.96	2.01	2.34	7.46	2.0	1.0	0.75	0.531
3000	4	8	4.0	14.35	3.10	5.035	11.85	2.0	1.0	1.25	0.656
4000	4	8	5.0	14.35	3.10	5.035	11.85	2.0	1.5	1.25	0.812
6000	5	10	6.0	14.85	3.82	5.035	12.35	2.75	2.75	1.25	0.812
8000	6	14	6.0	14.85	5.27	5.035	12.35	2.75	2.25	1.25	0.812

1000 amperes and above

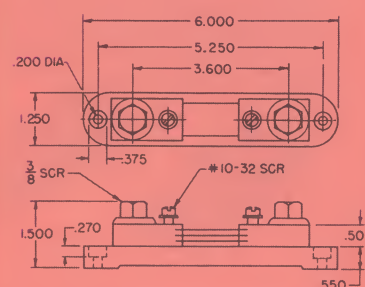
FOR A COMPLETE LIST OF ALL 50 & 100 MV SWITCHBOARD
SHUNTS ASK FOR CIRCULAR 01-407.

GENERAL DIMENSIONS

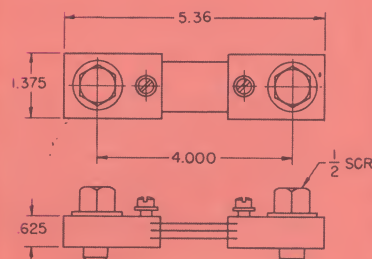
(ALL DIMENSIONS ARE APPROXIMATE)



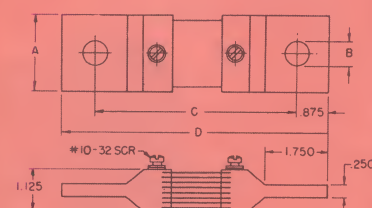
Up to 10 amperes



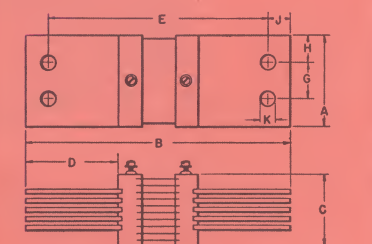
12 to 200 amperes



250 to 400 amperes



500 to 800 amperes



1000 amperes and above

SPECIAL METERS

SHUNTS

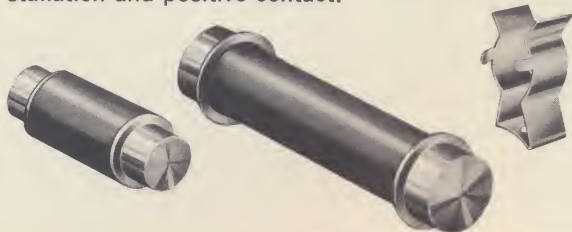
ACCESSORIES

TUBULAR RESISTORS

(SEE CIRCULAR 01-408 FOR COMPLETE SPECIFICATIONS.)

Weston Tubular Resistor Multipliers (Model 9858) use film type resistors. In tubular resistor form, the assembly surpasses or equals the performance of wire wound units in all respects. They meet and exceed all of the requirements of MIL-R-29A.

The resistor is intended to be mounted in a horizontal position in fuse clips on standoff insulators; however, it can be mounted in any position. The insulated portion of the tube should not be used for support, nor should it approach any metal closer than would be good practice for a live conductor carrying the same potential. Fuse clips are recommended having a spring clamping action for rugged mechanical installation and positive contact.



KV Rating	Resistance Megohms	Overall Length $\pm 1/32"$	MIL-R-29A Type	Prices
0.5	0.5	2 15/16"	MFC 504	\$ 7.20
0.8	0.8	2 15/16"	MFC 804	9.05
1.0	1.0	2 15/16"	MFC 105	9.05
1.5	1.5	5 9/32"	MFB 155	11.75
2.0	2.0	5 9/32"	MFB 205	13.25
2.5	2.5	5 9/32"	MFB 255	14.65
3.0	3.0	5 9/32"	MFB 305	16.45
3.5	3.5	5 9/32"	MFB 355	17.60
4.0	4.0	9 25/32"	MFA 405	20.80
5.0	5.0	9 25/32"	MFA 505	23.70
6.0	6.0	9 25/32"	MFA 605	26.55
10.0	10.0	16 1/2"	MFD 106	42.90
15.0	15.0	23 1/2"	MFE 156	61.00
20.0	20.0	30 1/2"	MFF 206	76.25

MODEL 9808 MOUNTING CLIPS FOR TUBULAR RESISTORS

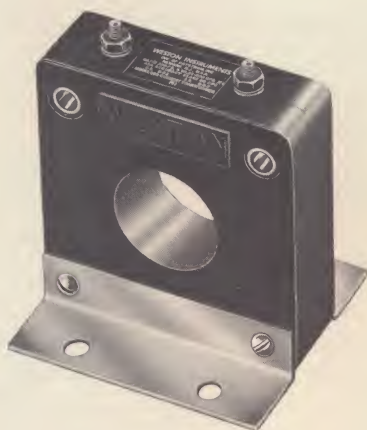
CATALOG NO.	TYPE	PRICE
9808 — 0029046	MFC	\$0.60 per pair
9808 — 0029047	MFA, MFB	0.75 per pair

TRANSFORMERS

(Current Type)

Current transformers extend the ranges of a-c ammeters as do shunts for d-c meters. Basic meter ranges for transformer use are usually 5 amperes. Meter transformers in addition to permitting measurement of large currents perform the important function of insulating the meter from the line. This affords safety in use.

Weston transformers are the inserted primary toroidal type and are for use with 1% and 2% panel ammeters.



SEE CIRCULAR 01-405 FOR COMPLETE SPECIFICATIONS.

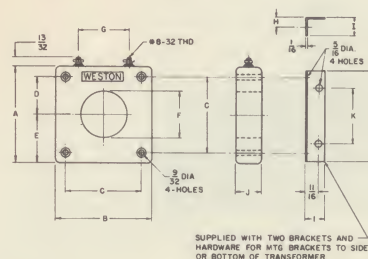
RANGES—Model 605 Current Transformer (5 Amp Secondary)

ASA ACCURACY CLASS 60 cps				
Primary Amps	...	B 0.1 2.5 va	B 0.2 5 va	Price
100	*	\$13.00
150	...	1.2	1.2	13.00
200	...	0.6	1.2	13.00
300	...	0.6	0.6	13.00
400	...	0.6	0.6	13.00

RANGES—Model 607 Current Transformer (5 Amp Secondary)

ASA ACCURACY CLASS 60 cps			
Primary Amps	B 0.1 2.5 va	B 0.2 5 va	Price
500	0.6	0.6	\$14.90
600	0.6	0.6	14.90
800	0.6	0.6	14.90
1000	0.3	0.3	17.70
1200	0.3	0.3	18.15
1500	0.3	0.3	18.60

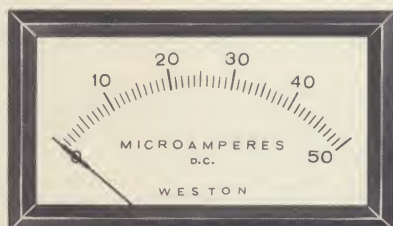
*Meets the requirements of ASA accuracy class 1.2 for ratio correction factor; phase angle errors will be less than 1° at 100% rated current and less than 2.5° at 10% rated current.



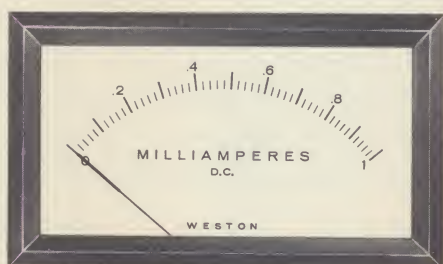
DIMENSION	A	B	C	D	E	F	G	H	I	J	K	L
MODEL 605	3 3/4	3 5/8	2 3/4	1 3/8	1 5/8	1 5/8	7/8	3/4	1 5/8	1 7/8	3 1/2	
MODEL 607	4 1/8	4 1/8	3 3/4	1 7/8	2 1/4	2 5/8	2 1/2	5/8	1 5/8	2 3/4	4 1/2	

MOUNTING BEZELS

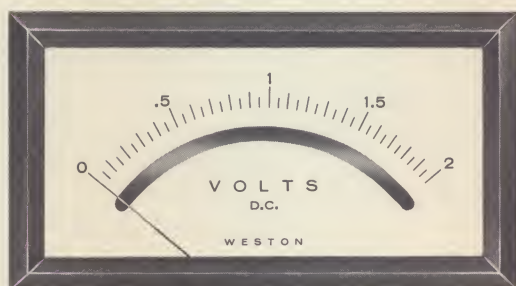
Mounting bezels are available for 1900 Series instruments with clear plastic fronts only. They have been designed for panel thicknesses of $\frac{1}{8}$ " max. and are supplied in a flat black enamel finish. Each bezel, its mounting hardware and drilling template are packed in a plastic bag.



2 1/2" 1920 SERIES (See Page 4)

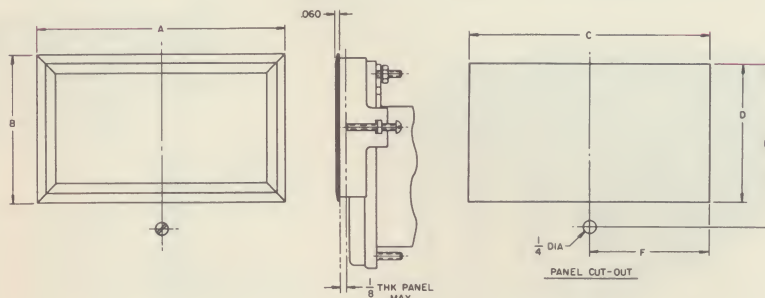


3 1/2" 1930 SERIES (See Page 6)



4 1/2" 1940 SERIES (See Page 10)

Only the scale is visible since meter is mounted behind the panel . . . half bezel fits into window.



MODEL	A	B	C	D	E	F
1921 1922 1924	3.120	1.720	3.000	1 19/32	2.070	1 1/2
1931 1932 1934 1936	3.860	2.265	3 23/32	2 5/32	2.550	1 55/64
1941 1942 1944 1946	4.960	2.900	4 13/16	2 3/4	3.290	2 13/32
1951 1954 1956	6.060	3.300	5 7/8	3 5/32	3.950	2 15/16
1971 1976	8.250	4.450	8 1/16	4 17/64	5.670	4 1/32

COLOR PLASTIC INSERTS CAN BE SUPPLIED WITH PLASTIC FRONTS ON THE 1920, 1930, 1940 AND 1950 SERIES AT \$.55 LIST EXTRA. STANDARD COLORS ARE GRAY OR YELLOW. OTHER COLORS AVAILABLE.

ILLUMINATION KITS

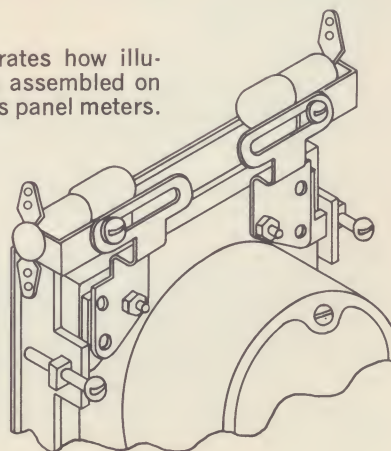
(For use with Plastic Front Model 1900 Series Meters only)

If scale illumination is required a kit can be furnished at an additional charge. Kit consists of: (1) Special half frame bezel, (2) Mounting brackets and light sockets. (Bulbs not included. Recommended bulb: NEMA #47 - 64 Frosted White Lamp). Weston Part No. ND 21865 at \$.24 each.

Model	Part No.	Each
1930 Series	245509	\$4.50
1940 Series	245510	\$4.50
1950 Series	245511	\$4.95

NOTE: Panel cutout same as shown for mounting bezels above.

Drawing illustrates how illumination kit is assembled on the 1900 Series panel meters.



GLOSSARY OF TERMS (Cont.)

OVERSHOOT OR OVERSWING is the ratio of the over-travel of the pointer beyond a steady deflection to the steady deflection when a new constant value of the measured quantity is suddenly applied. Overshoot and damping factor have a reciprocal relationship.

EXAMPLE

The pointer of an instrument has a momentary deflection to 100° and has a steady deflection of 80°.

$$\% \text{ O.S.} = \left(\frac{100 - 80}{80} \right) 100 = \left(\frac{20}{80} \right) 100 = 25\%$$

If the overswing requirement is given for a certain circuit resistance, the instrument should be tested for overswing with that resistance in series with the instrument. Otherwise, the instrument should be tested for overshoot in a circuit of at least 100 times the resistance of the instrument under test. Not applicable to voltmeters.

RESPONSE TIME is the time required until the pointer has first come to apparent rest, after an abrupt change in excitation to a new constant value has occurred.

If a response time requirement is given for a certain circuit resistance, the instrument should be tested for response time with that resistance in series with the instrument. Otherwise, the instrument should be tested for response time in a circuit of at least 100 times the resistance of the instrument under test.

REPEATABILITY ACCURACY is the ability of an instrument to repeat its readings taken when deflecting the pointer upscale by the reading taken when deflecting the pointer downscale, expressed as a percentage of the rated full scale value.

EXAMPLE

At the division line closest to $\frac{1}{2}$ scale a 100 microampere instrument needs 51 microamperes to accomplish upscale deflection and only 49 microamperes to accomplish downscale deflection.

$$\text{Repeatability} = \left(\frac{51 - 49}{100} \right) 100 = 2\%$$

CREEP is the change in pointer deflection with time with a known constant current applied.

STICKINESS is a condition caused by physical interference with the rotation of the moving element.

FULL SCALE SENSITIVITY is the actual excitation required for full scale deflection.

EXAMPLE

An instrument has a rated full scale sensitivity of 100 microamperes but the actual full scale sensitivity is 101 microamperes.

The sensitivity error is

$$\left(\frac{I_r - I_A}{I_r} \right) 100 = \left(\frac{100 - 101}{100} \right) 100 = 1\%$$

INSULATION RESISTANCE is the resistance offered by the insulating members of an instrument part to an impressed direct voltage tending to produce a leakage of current through or on the surface of these members.

DIELECTRIC WITHSTANDING VOLTAGE is the application of voltage between all external live parts of the instrument and the exposed metal parts on the front of the instrument, and the metal panel on which the instrument is mounted.

STATIC CHARGE INFLUENCE is deflection of the instrument pointer caused by external forces due to static acting on the moving element.

EXTERNAL TEMPERATURE INFLUENCE is the percentage change of full scale value in the indication of an instrument that is caused solely by a difference in ambient temperature from the reference temperature.

FREQUENCY INFLUENCE is the percent change of full scale value in the indication of an instrument that is caused solely by a frequency departure from a specified reference frequency.

Frequency influence is applicable only to instruments other than frequency meters.

CONVERSION FACTORS, FORMULAS, TABLES

Conversion Factors and Constants

$\pi = 3.14$	$2\pi = 6.28$
$\pi^2 = 9.87$	$(2\pi)^2 = 39.5$
$\epsilon = 2.718$	$\sqrt{2} = 1.414$
$\sqrt{3} = 1.732$	$\log \pi = 0.497$
1 meter = 39.37 inches = 3.28 feet	
1 kilometer = 0.621 mile (about 3/5 mile)	
1 inch = 2.54 centimeters	
1 kilogram = 2.2 pounds	
1 liter = 1.06 quarts	
1 ounce = 28.35 grams	
1 horsepower = 746 watts	

Ohm's Law Formulas for D-C Circuits

$$I = \frac{E}{R} = \sqrt{\frac{P}{R}} = \frac{P}{E} \quad R = \frac{E}{I} = \frac{P}{I^2} = \frac{E^2}{P}$$

$$E = IR = \frac{P}{I} = \sqrt{PR} \quad P = I^2 R = EI = \frac{E^2}{R}$$

Ohm's Law Formulas for A-C Circuits

In these formulas θ is the angle of lead or lag between current and voltage and $\cos \theta = P/EI =$ power factor.

$$I = \frac{E}{Z} = \sqrt{\frac{P}{Z \cos \theta}} = \frac{P}{E \cos \theta}$$

$$E = IZ = \frac{P}{I \cos \theta} = \sqrt{\frac{PZ}{\cos \theta}}$$

$$Z = \frac{E}{I} = \frac{P}{I^2 \cos \theta} = \frac{E^2 \cos \theta}{P}$$

$$P = I^2 Z \cos \theta = IE \cos \theta = \frac{E^2 \cos \theta}{Z}$$

Resistors in Series

$$R_{\text{total}} = R_1 + R_2 + R_3 + \dots$$

Two Resistors in Parallel

$$R_t = \frac{R_1 R_2}{R_1 + R_2} \quad R_1 = \frac{R_t R_2}{R_2 - R_t}$$

(Cont.)

CONVERSION FACTORS, FORMULAS, TABLES (Cont.)

Equal Resistors in Parallel

$$R_{\text{total}} = \frac{R}{n}, \text{ where } n \text{ is the number of resistors}$$

Resistors in Parallel, General Formula

$$R_{\text{total}} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots}$$

Sinusoidal Voltages and Currents

Effective value = $0.707 \times \text{peak value}$
 Average value = $0.637 \times \text{peak value}$
 Peak value = $1.414 \times \text{effective value}$
 Effective value = $1.11 \times \text{average value}$
 Peak value = $1.57 \times \text{average value}$
 Average value = $0.9 \times \text{effective value}$

Conductance, Susceptance, and Admittance

$$G = \frac{1}{R} \text{ (for D-C circuit)}$$

$$G = \frac{R}{R^2 + X^2} \text{ (for A-C circuit)}$$

$$B = \frac{1}{X} \text{ (when resistance is 0)}$$

$$B = \frac{X}{R^2 + X^2}$$

$$Y = \frac{1}{Z} = \frac{1}{\sqrt{R^2 + X^2}}$$

Reactance Formulas

$$X_C = \frac{1}{2\pi fC}$$

$$C = \frac{1}{2\pi fX_C}$$

$$X_L = 2\pi fL$$

$$L = \frac{X_L}{2\pi f}$$

Resonant Frequency Formulas

$$f = \frac{1}{2\pi\sqrt{LC}}, \text{ or } f = \frac{159.2^*}{\sqrt{LC}}$$

$$L = \frac{1}{4\pi^2 f^2 C}, \text{ or } L = \frac{25,330^*}{f^2 C}$$

$$C = \frac{1}{4\pi^2 f^2 L}, \text{ or } C = \frac{25,330^*}{f^2 L}$$

*where in the second formula f is in kc and L and C are in microunits.

Impedance Formulas

$$Z = \sqrt{R^2 + (X_L - X_C)^2} \text{ (for series circuit)}$$

$$Z = \frac{RX}{\sqrt{R^2 + X^2}} \text{ (for } R \text{ and } X \text{ in Parallel)}$$

Power Factor

$$\text{pf} = \cos \theta, \text{ where } \theta \text{ is the angle of lead or lag}$$

$$\text{pf} = \frac{\text{true power}}{\text{apparent power}} = \frac{P}{EI}$$

$$\text{pf} = \frac{R}{Z}$$

Q or Figure of Merit

$$Q = \frac{X_L}{R} \text{ or } \frac{X_C}{R}$$

Transformer Relationships

$$\frac{N_P}{N_S} = \frac{E_P}{E_S} = \frac{I_S}{I_P} = \sqrt{\frac{Z_P}{Z_S}}$$

Efficiency (for any device)

$$\text{Eff} = \frac{\text{output}}{\text{input}}$$

Decibel Formulas

When impedances are equal,

$$\text{db} = 10 \log \frac{P_1}{P_2} = 20 \log \frac{E_1}{E_2} = 20 \log \frac{I_1}{I_2}$$

When impedances are unequal,

$$\text{db} = 10 \log \frac{P_1}{P_2} = 20 \log \frac{E_1 \sqrt{Z_2}}{E_2 \sqrt{Z_1}} = 20 \log \frac{I_1 \sqrt{Z_1}}{I_2 \sqrt{Z_2}}$$

DECIBEL TABLE

DB	Voltage or Current Ratio		DB	Voltage or Current Ratio	
	Power Ratio	Ratio		Power Ratio	Ratio
0	1.00	1.00	10	10.0	3.2
0.5	1.12	1.06	15	31.6	5.6
1.0	1.26	1.12	20	100	10
1.5	1.41	1.19	25	316	18
2.0	1.58	1.26	30	1,000	32
3.0	2.00	1.41	40	10,000	100
4.0	2.51	1.58	50	10 ⁵	316
5.0	3.16	1.78	60	10 ⁶	1,000
6.0	3.98	2.00	70	10 ⁷	3,162
7.0	5.01	2.24	80	10 ⁸	10,000
8.0	6.31	2.51	90	10 ⁹	31,620
9.0	7.94	2.82	100	10 ¹⁰	10 ⁵

Frequency and Wavelength

$$f_{\text{kc}} = \frac{3 \times 10^5}{\lambda_{\text{meter}}}$$

$$\lambda_{\text{meter}} = \frac{3 \times 10^5}{f_{\text{kc}}}$$

$$f_{\text{Mc}} = \frac{3 \times 10^4}{\lambda_{\text{centimeter}}}$$

$$\lambda_{\text{cm}} = \frac{3 \times 10^4}{f_{\text{Mc}}}$$

$$f_{\text{Mc}} = \frac{984}{\lambda_{\text{feet}}}$$

$$\lambda_{\text{feet}} = \frac{984}{f_{\text{Mc}}}$$

WESTON INSTRUMENTS, INC.

NEWARK DIVISION

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